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REMARKS

Claims 1-52 are currently pending in the subject application and are presently under consideration. Claims 3-34, and 36-52 have been amended herein to correct minor informalities. A version of all pending claims is shown at pages 2-9 of this Reply.

In addition, it appears as though the Examiner has introduced new statutory grounds for the rejection of claims 1-7, 13-28, 30-34, 38-46 and 48-52 that was not necessitated by amendments to the claims. In particular, at page 3 of the Final Office Action (dated June 30, 2005), the Examiner concedes that the reference does not disclose all the claim limitations, but introduces a secondary reference the Examiner alleges cures this deficiency (*i.e.*, "*Voth in view of Kuribayashi discloses the capability to transmit time synchronization information and non time synchronization data over an interconnected network*"). The Examiner is impermissibly employing the teachings of two references to reject the aforementioned claims under 35 U.S.C. §102. Accordingly, applicants' representative requests the Examiner withdraw this rejection, or cast the rejection under the proper statutory grounds so that applicants' representative can make a consistent response to the Examiner's rejection. Additionally, since the new grounds for rejection were not based upon claim amendments, the finality of the Office Action should be withdrawn.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-7, 13-28, 30-34, 38-46 and 48-52 Under 35 U.S.C. §102(e)

Claims 1-7, 13-28, 30-34, 38-46 and 48-52 stand rejected under 35 U.S.C. §102(e) as being anticipated by Voth (US Patent No. 6,199,169). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Voth does not teach or suggest each and every element of applicants' invention as set forth in the subject claims.

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A **single** prior art reference anticipates a patent claim only if it expressly or inherently describes *each and every limitation set forth in the patent claim*. *Trintec Industries, Inc., v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 U.S.P.Q.2D 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). *The identical invention must be shown in as complete detail as is contained in the ... claim*. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (emphasis added).

Applicants' claimed invention relates to industrial control systems with a time synchronization apparatus for synchronizing operation of a first controller with that of a second controller. In particular, independent claim 1 (and similarly independent claims 38, 39, and 52) recites, "A time synchronization apparatus *for synchronizing operation of a first controller with that of a second controller in a control system*, the synchronization apparatus comprising: a processor interface for *interfacing the synchronization apparatus with a host processor*; a transmitter adapted to transmit *synchronization information and data to a network in the control system*". Voth does not teach or suggest these novel features.

Rather, Voth relates to a method of time synchronization in a computer cluster system. (See Abstract). The system includes a master node and a plurality of slave nodes, interconnected via a computer network. (See FIG. 1; col. 4, ll. 7-17). Voth teaches transmitting synchronization information, but, as the Examiner concedes at page 3 of the Final Office Action, does not teach transmitting *synchronization information and data to a network in the control system*. Accordingly, this rejection of independent claims 1, 38, 39, and 52 as well as all claims that depend there from should be withdrawn.

Additionally, at page 2, the Final Office Action incorrectly interprets the system (e.g., FIG 1, item 100) as the synchronization apparatus of the claimed invention. If, as the Examiner indicates, the system 100 is the synchronization apparatus and the network 104 is an interface, then Voth does not disclose a processor interface for *interfacing the synchronization apparatus with a host processor*. Rather, under the Examiner's interpretation, Voth discloses a network for *interfacing the constituents of a synchronization apparatus with other constituents*. This distinction is readily apparent: the network 104 in Voth interfaces nodes with other nodes, all of which are constituents of the system 100, but none of which are the system 100 and, therefore,

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none are the synchronization component. Voth is silent regarding whether anything other than a node can be attached to the computer network, and all nodes that are attached are constituents of the system. (See col. 4, ll. 11-13). Accordingly, Voth does not teach or suggest that the system is interfaced with anything, let alone with a host processor.

Moreover, as recited in independent claim 1 (and similarly independent claims 38, 39, and 52), the synchronization apparatus synchronizes "*operation of a first controller with that of a second controller in a control system*". According to the Examiner's interpretation (i.e., that the system is the synchronization component), in Voth the network and everything attached to it (i.e., all nodes) are self-contained within the synchronization component. Therefore, Voth synchronizes nodes within the synchronization component, but does not synchronize *a first controller with that of a second controller in a control system*. Similarly, Voth does not disclose a transmitter adapted to transmit synchronization information and data *to a network in the control system*, as recited in the aforementioned claims. Rather Voth teaches transmitting synchronization information to a network *in the synchronization component*.

Applicants' claimed invention further relates to a synchronization module in a control chassis for synchronizing operation of a first controller in the control chassis with that of a second controller *outside the control chassis*. In particular, independent claim 38 recites, "a host processor in communication with the first controller *via a backplane bus in the control chassis*; a transmitter adapted to transmit synchronization information and data to *a network in the control system*". Voth does not teach or suggest each and every element of the subject claim.

In particular, Voth teaches only one means by which the constituents of the system can communicate, which is the network 104, whereas the instant claim of the subject invention recites distinct components by which communication is possible (e.g., a backplane bus and a network in the control system). The Examiner indicates that the network 104 is the backplane bus in the control chassis. (See Final Office Action, page 9). Therefore, Voth does not teach or suggest transmitting synchronization information and data to *a network in the control system*. Moreover, Voth is silent as to whether the network 104 (i.e., the backplane bus in the control chassis) can communicate with a second controller *outside the control chassis*.

Applicants' claimed invention further relates to a synchronization circuit for synchronizing operation of a first controller with that of a second controller in a control system. In particular, independent claim 39 (and similarly independent claim 52) recites, "the

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synchronization circuit is *configurable by the host processor* to operate as one of a synchronization master and a synchronization slave.” Voth does not teach or suggest these novel features. Rather, Voth teaches that one of the nodes assumes a master role and the remaining nodes function as slaves (*see* col. 4, ll. 37-39), but the reference is silent regarding whether the nodes are *configurable by the host processor*. Accordingly, Voth does not teach or suggest the synchronization circuit is *configurable by the host processor* to operate as one of a synchronization master and a synchronization slave.

In view of at least the above, it is apparent Voth does not disclose or suggest the subject invention as described in independent claims 1, 38, 39 and 52 as well as the associated dependent claims. Moreover, the Examiner has introduced the teachings of a secondary reference in connection to the instant claims, whereas 35 U.S.C. §102 requires a single reference. Accordingly, this rejection should be withdrawn.

II. Rejection of Claims 8-12 Under 35 U.S.C. §103(a)

Claims 8-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Voth (US Patent No. 6,199,169) in view of Ramussen, *et al.* (US Patent No. 6,449,732). Withdrawal of the rejection is respectfully requested because Voth and Ramussen, *et al.*, either alone or in combination, fail to teach or suggest the applicants’ claimed invention. In addition, Voth is directed toward non-analogous art and is therefore not reasonably pertinent to be relied upon as a basis for rejection.

Claims 8-12 depend directly or indirectly upon independent claim 1. As noted *supra*, Voth does not teach or suggest applicants’ invention recited in the subject claims. Ramussen, *et al.* fails to make up for the aforementioned deficiencies of Voth and this rejection should be withdrawn.

Moreover, Voth is non-analogous art. “In order to rely on a reference as a basis for rejection of an applicant’s invention, the reference must either be in the field of applicants’ endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.” *In re Oetiker*, 977 F.2d 144, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). See also *In Re Deminski*, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986); *In re Clay*, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992). Voth relates to a method of synchronization, however, this method is very limited because it works in a Single System Image

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(SSI) computer cluster (*see* col. 4, ll. 35-38) and requires a very high speed network (*see* col. 4, ll. 19-22), whereas the subject invention can operate with industrial controllers in a distributed control system network. For example, in Voth, the maximum round-trip time of a SYNC message sent from the master to the slave and back to the master is assumed to be no more than 1 microsecond (*i.e.*, 1 μ s). (*See* col. 8, ll. 44-56). While this round-trip time of 1 μ s is exemplary, and other values are contemplated (up to 5 μ s; *see* col. 8, ll. 64-66), the precision of the synchronization algorithm is proportionate to the speed of the network. (*See* col. 8, ll. 57-58).

In order to affect synchronization, the round-trip time for a SYNC message must be less than half of a clock tick, where a clock tick is taught to be 10 μ s. (*See* col. 8, ll. 60-66). The synchronization algorithm effectively treats the propagation time (*i.e.*, latency) between the nodes as zero when synchronizing, which is why the round-trip time must be about 1 μ s, and also why this method applies only to SSI computer clusters or similar systems with very high speed networks of a particular topology. The reference will not work in conventional networks in a control system wherein the latency between the controllers can be on the order of 50 μ s (producing a 100 μ s round-trip time), which is about 20 times too imprecise to affect synchronization using the method disclosed in Voth. Moreover, Voth cannot function in topologies other than a star topology wherein all slave nodes are directly connected to the master node, whereas conventional networks in a control system assume many topologies, such as a daisy-chain and ring topologies. In various other topologies, the round-trip time to communicate from the master to all slave nodes and back can be on the order of 1200 milliseconds, which is about 240,000 times too imprecise to affect synchronization by employing the method of Voth. As such, Voth cannot function within conventional industrial control system network environments, and is therefore not "reasonably pertinent to the particular problem with which the inventor was concerned."

III. Rejection of Claims 29, 35-37 and 47 Under 35 U.S.C. §103(a)

Claims 29, 35-37 and 47 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Voth (US Patent No. 6,199,169) in view of Kuribayashi, *et al.* (US Patent No. 6,775,246). Withdrawal of the rejection is respectfully requested for at least the following reasons. Voth and Kuribayashi, *et al.*, alone or in combination, do not teach or suggest the applicants' claimed

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invention. Furthermore, Voth relates to non-analogous art and cannot be relied upon as a basis for rejection.

Claims 29 and 35-37 depend directly or indirectly upon independent claim 1 while claim 47 depends directly or indirectly upon independent claim 39. As noted *supra*, Voth fails to teach or suggest applicants' invention as recited in the subject claims. Kuribayashi, *et al.* fails to make up for the aforementioned deficiencies of Voth with respect to independent claims from which claims 29, 35-37 and 47 depend, respectively. Moreover, as submitted *supra* with respect to the rejection of claims 8-12, Voth is non-analogous art, and as such cannot be used as a basis for rejection. Accordingly, this rejection should be withdrawn.

Conclusion


The present application is believed to be in condition for allowance in view of the above comments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [ALBRP228US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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